13. Integrating European Life Sciences

Introduction

Internationality and collaboration are vital aspects of EMBL research, and EMBL works to establish links and initiate collaborative relationships between scientific communities in Europe and the wider world. EMBL's International Relations team is actively involved in discussions around European science policy and promotes relationships between EMBL and institutions in the EMBL member states, including EMBL's successful network of partnerships. In this new programme EMBL's international relations strategy will help coordinate efforts within and between our member states, to propel Europe into a new era of life sciences as a global leader.

Member States

During 2017–2021, a number of member states joined EMBL, either as full or prospect member states: Lithuania, Poland, Slovakia, Hungary, Montenegro, Malta, Estonia, and Latvia. EMBL engaged in numerous institutional visits, dedicated events, and workshops in these countries in order to help initiate more links between new members and the EMBL research community. For example, information days were held in Poland, Slovakia, Estonia, and Lithuania, while with other countries, such as Montenegro, exchanges focused on the training of young talent, either at EMBL or via the organisation of summer schools in the country. EMBL remains open to new countries joining the Laboratory, in particular it would welcome membership of all EU countries.

In leading up to the new Molecules to Ecosystems Programme, EMBL has consolidated its **links to research communities** in its member states by engaging in strategic collaborations and partnerships. For example, in 2019 EMBL and the Crick Institute concluded an agreement to stimulate cooperation between the leading life science researchers working at both institutes. Also in 2019, EMBL formed a collaboration with the Portuguese Foundation for Science and Technology to train future engineers. Future efforts will further relations with institutes in member states, nurturing scientific collaborations and increasing service and training possibilities. Many institutional agreements aimed at creating collaborative links in the research areas of the new Programme are currently being esablished, with new partnerships considered based on the scientific need and interest of member states. EMBL has already been able to identify collaborative opportunities in areas such as Planetary Biology, Microbial Ecosystems, Data Sciences, and Human Ecosystems, with institutes in several member states. In close coordination with the Council delegates, EMBL will strengthen engagements with national actors with expertise in many fields that can both benefit from and play a key role in the implementation of this collaborative new Programme. EMBL has also set up an "ambassadors" initiative, comprising key EMBL scientists who will be particularly engaged in these activities and will be the link between the Laboratory and the member states. The new mobile laboratories proposed as part of Planetary Biology are a key initiative to not only bring expertise and service to member states, but also to reach young researchers, school children, and teachers as part of an outreach action (Chapters 10, 11, and 15: Scientific Services, Training, and Public Engagement, Communications, and Outreach).

EMBL will also **collaborate with multiple relevant research infrastructures** situated in member states. For example, EMBL will interact closely with the European Marine Biological Resource Centre (EMBRC-ERIC) (see below) and the ecotron/mesocosm facilities around Europe in the context of Planetary Biology. EMBL will also forge closer links with the European Spallation Source (ESS) in order to make the most of available expertise and technologies, and to facilitate the creation of a critical mass of life science users.

EMBL has also been awarded five Horizon 2020 **Twinning projects** which have been an important instrument for connecting to the Czech and Portuguese research communities. These grants have enabled knowledge transfer from EMBL to various institutes in the area of bioinformatics, experimental techniques, computational biology, and microbiota research. The engagement of EMBL researchers in EU grants that encourage a transfer of excellence remains an important priority for the future programme and **Horizon Europe**. Besides transferring knowledge, these joint projects also create pan-European networks of expertise across EMBL member states, benefiting both the main beneficiary countries and the wider EMBL member states' community.

EMBL will seek to connect to its member states to an even greater extent in this Programme, through institutional as well as personal links. EMBL also commits to facilitating the integration and return of trained scientists and engineers to member states. EMBL's 9-year turnover model (also utilised by the EMBL partnerships) ensures EMBL is dynamic, agile, and cutting-edge, and able to rapidly embark on new scientific directions. The turnover model also means that 20% of EMBL's highly-skilled and trained personnel leave EMBL each year, with nearly 81% entering the workforce of the member states. Importantly, these alumni help to build and strengthen EMBL's network of connections to institutions worldwide which ultimately helps to drive forward scientific progress (Chapter 15: Public Engagement, Communications, and Outreach).

The recent pandemic has revealed how imperative it is that countries pool resources, cooperate on projects, and align strategic directions to drive forward scientific progress and deliver research that is relevant to pressing societal challenges. EMBL's capacity to respond immediately to the COVID-19 pandemic illustrates the key role that it can play in providing both excellent science and critical service for Europe in times of crisis and at no additional cost to the member states. This included establishing the COVID-19 Data Portal (which is hosted by EMBL-EBI: www.covid19dataportal.org) which has been key in accelerating SARS-CoV-2 research, with benefits to all member states as well as the wider European community. Data sharing is key to understanding the biology, epidemiology, transmission, and evolution of the virus, bringing the scientific community one step closer to creating diagnostics, therapeutics, and effective vaccines. The development of the Data Portal spurred data coordination activities in many member states, providing much needed infrastructure and guidance to national efforts to store and share relevant datasets, as well as shared computational spaces where scientists and public health workers can collaborate. Access to EMBL infrastructures and core facilities, application of EMBL's foundational expertise in imaging (Cryo-EM) and imaging analysis tools as well as freely available cutting edge scientific information (e.g. the SARS CoV-2 conference organised by EMBL in July 2019) are examples of what EMBL could deliver. As Europe's only life sciences research organisation, EMBL's role will be critical in order to meet future challenges.

The COVID-19 pandemic is leading to unprecedented financial and social instability around the world. The impact of the economic situation on research ecosystems in Europe and around the world has been and will continue to be significant. EMBL mediated integration will be even more essential now, given resource limitations and the need for research to be more coordinated, effective, and cross-border than ever before. Large, shared European research infrastructures such as EMBL's, highlight the power of collaboration and joint investment. For example, the structural biology services provided by EMBL and partners at Grenoble and Hamburg have been facilitating instrumental COVID-19 structural biology research relating to SARS-CoV-2. The collective power of shared RIs have become more pronounced in a world where pandemics like COVID-19 have shown the critical need for greater scientific coordination across Europe and a greater trust in science. Above all, EMBL will continue to strongly advocate for fundamental research, evidence-based solutions, and open science, to tackle future challenges. The contribution that science will make towards economic recovery and public health is undeniable, and EMBL has an important role to play in this.

Associate Member States

EMBL's strongest institutional engagement outside Europe will continue to be with its associate member states, where EMBL seeks to build links with institutes and communities that relate to the priorities of the Molecules to Ecosystems Programme.

In the past years, EMBL's links to Australia, its first associate member, have deepened and expanded. EMBL supports a growing network of excellent research groups distributed across Australia which are modelled on EMBL. Through this network as well as through various exchanges, joint workshops, meetings and use of services and facilities, EMBL has been in a position to contribute to the advancement of Australia's national priorities such as internationalisation of research, increasing big data capacity, imaging and the development of ambitious research projects in various areas related to life sciences research. Adding to the already existing collaborative areas, EMBL will seek to connect and contribute to Australia's safeguarding efforts in relation to its unique biodiversity and marine ecosystems which are a major importance in the new EMBL programme.

To ensure that the pollination of ideas, projects and infrastructure is possible, EMBL will remain open to expanding its network of associates to include countries that are able, jointly with EMBL, to deliver outstanding contributions in exploring ecosystems at the molecular level with a commitment to support and empower young scientific talent. However such engagement will need to be rooted in proven, strong collaborative links, significant research capacity on both sides, and a commitment to disseminate excellence across regional and international networks.

EMBL Partnership Programme

The EMBL Partnership Programme has been a remarkably successful way of enabling closer links with EMBL member states through the creation of **EMBL-modelled inter-institutional research partnerships**. EMBL's model builds on a set of principles that make its operation and output unique. EMBL's scientific openness, interdisciplinarity, and ability to seamlessly rejuvenate its research profile by following a staff turnover principle, has placed it as a top European institute in the life sciences. This is complemented by international talent searches for staff recruitment and a continuous, rigorous external evaluation of research activities and services. EMBL's successful model for nurturing excellence and young talent has inspired a number of member states to implement a similar *modus operandi* in the establishment of national institutes.

Helping member states establish national centres of excellence modelled on EMBL is, and will continue to be, at the heart of the EMBL Partnership Programme. Inter-institutional partnerships have not only been a way to secure better integration and participation of national scientific communities into EMBL's research and activities, but also an opportunity to help member states recruit excellent international talent with EMBL's support. As a result, the network today includes six EMBL-modelled partnerships located in different member states (Figure EC1).

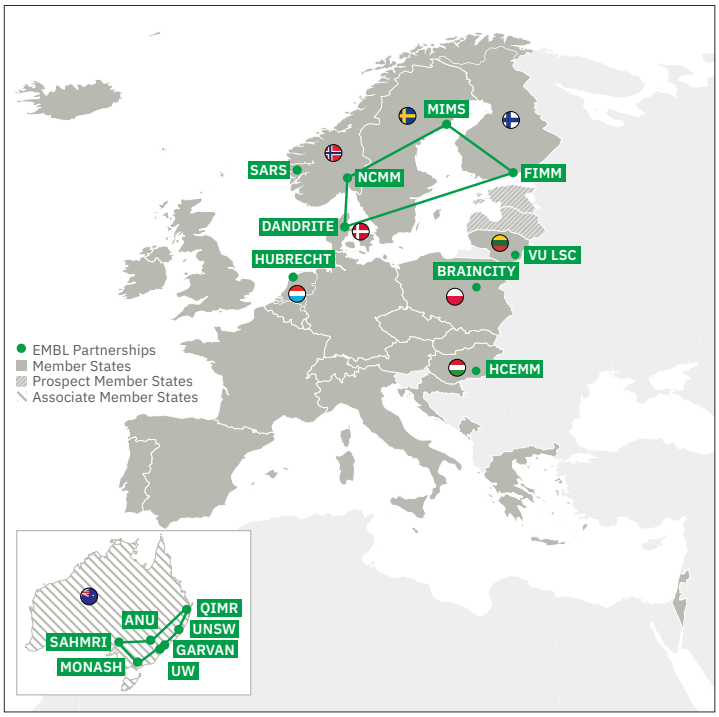

Figure EC1 | EMBL partnerships.

The EMBL-Hubrecht Partnership for Stem Cell and Tissue Biology (**Hubrecht**); the Partnership with the Sars International Centre for Molecular Marine Biology (**SARS**), the EMBL Australia Partnership Laboratory comprising seven institutes; the Hungarian Centre of Excellence for Molecular Medicine (**HCEMM**)-EMBL partnership; the **Nencki-EMBL Partnership** for Neural Plasticity and Brain Disorders (**BRAINCITY**); and the **Nordic EMBL Partnership for Molecular Medicine** comprises four institutes: Centre for Molecular Medicine Norway (NCMM) – University of Oslo; Molecular Infection Medicine (MIMS) – Umeå University, Sweden; Institute for Molecular Medicine Finland (FIMM) – University of Helsinki, Finland; and Danish Research Institute of Translational Neuroscience (DANDRITE) – Aarhus University.

A set of criteria is considered when entering into inter-institutional collaborations.

- Each partner institute should strive for **scientific excellence** at the national level and the international level. **Scientific complementarity** to EMBL's research is also very important, but can be fulfilled in different ways: it can encompass research fields that are not extensively covered by EMBL or areas in which EMBL is active, but in which the partner has a distinct scientific competence. Ultimately, the aim is to enable **significant scope for common initiatives**. Further, it is essential that all EMBL partners commit to a **high-level, regular, and international evaluation** of their activities with consequences for tenure and funding. A review board can be established with EMBL's support and participation.
- One of the core principles that EMBL promotes through its partnership model is **staff turnover**. While it may be challenging to establish such a system at the national level, it is essential in supporting the partners to become national centres of excellence to attract and train young talent for a limited period of time, before they move on to other national institutions.
- A partnership between EMBL and the partner institute is built on the precondition that both partners are **scientifically, operationally, and financially independent**. Independence is generally perceived as the absence of direct influence from external interest and it is particularly important that partners have genuine scientific, operational and financial autonomy. Partner independence is of great value to EMBL, as it promotes research freedom and ambition. Finally, EMBL partner institutes are expected to promote amongst their staff and in leadership the principles of **equality, diversity, anti-harassment, and scientific integrity**.

The operational implementation of each partnership is determined in negotiations between the partners; however, EMBL's involvement is multi-layered and often includes support in various aspects relating to the governance, recruitment and scientific evaluation process of the partner institute.

The largest partnership, spanning four countries, is the **Nordic EMBL Partnership for Molecular Medicine** which was established in 2007 and now brings together approximately 600 people and 25 research groups with a budget of nearly €60 million (Figure EC2). The Nordic Partnership has been successful in creating a critical mass of translational researchers, recruiting excellent international talent, acting as a multiplier of excellence locally and regionally with many affiliated researchers, and raising funds that would not have been available for research if not for the partnership. The scientific output from the Nordic Partnership is clear, with more than 400 scientific publications in 2018 from the four institutes. The individual Nordic research centres also engage in collaborations with other national partners, including research and public health institutes, hospitals and research councils, to establish an extensive Nordic network for molecular medicine and mediate information of EMBL activities, openings, and facilities of interest to the host environment.

Figure EC2 | Nordic EMBL Partnership statistics for 2018.

Group leaders were hired within the four institutes (NCMM, MIMS, FIMM, and DANDRITE) following the EMBL model for recruitment; regular evaluation of group leaders' research is supported by EMBL staff and run according to EMBL principles.

Following EMBL's membership expansion in Central Europe, two new partnerships emerged in 2018 and 2019, and two are being negotiated in the course of 2020. In 2019, EMBL supported the creation of the **Centre of Excellence for Neural Plasticity and Brain Disorders (BRAINCITY)**, an independent research unit embedded in the Nencki Institute, Poland. The key aims of BRAINCITY are: to advance scientific understanding of the mechanisms of brain disease and thus identify critical target genes and molecules; to identify biomarkers of diseases, for better diagnosis, prediction and monitoring of disease; and to develop novel therapeutic approaches targeting abnormal genes and proteins, as well as neuronal network deficiencies.

Also in 2019, the **HCEMM-EMBL Partnership for Molecular Medicine** was established in Hungary, to pursue scientific discoveries in cancer, cardiovascular, and inflammatory diseases especially affecting older individuals, thereby providing a bridge from fundamental to translational research. HCEMM is the Hungarian Centre of Excellence for Molecular Medicine and was founded by the Biological Research Centre, the University of Szeged, and Semmelweis University. The HCEMM-EMBL partnership is based on a project from the Horizon 2020 Teaming initiative, whose funding is complemented by considerable national funds. All principles of an EMBL partnership through the Teaming initiatives remain unchanged.

In 2020, partnership discussions were initiated with the **Vilnius University Life Sciences Centre (VULSC)** in Lithuania. The focus is on CRISPR-Cas9 technologies. Also in 2020, EMBL and the **Systems Biology Ireland (SBI)** institute expect to kick off their partnership that will focus on tackling childhood cancer. This represents a unique research opportunity and unmet clinical need to preserve and enhance the efficacy of treatment while reducing long-term side effects. The SBI-EMBL partnership would aim to address these challenges by developing personalised diagnostics and treatments based on a thorough understanding of molecular mechanisms obtained through innovative methods in computational modelling and data integration of omics datasets.

In the next period, EMBL's objective for its Partnership Programme will be two-fold:

- To continue supporting the concept of institutional partnerships as a flexible and financially sound mechanism by which the interaction between EMBL and the member states can be enhanced.
- To decisively improve the visibility of the Partnership Programme across the different partners, and increase the collaborative links between research conducted at EMBL and at the partner institutes through a set of flexible instruments.

On the first point, EMBL will continue nurturing its existing partnership network, while remaining open and inviting member states to come forth with proposals for new partnerships that will augment national and EMBL capabilities in fields such as planetary biology, human ecosystems, infection biology, microbial ecosystems, data sciences, and theory.

As the partnership network matures and expands, it also becomes more scientifically diverse. To fulfil its second objective and harness the scientific wealth and innovation potential of its network, EMBL will seek to enable a significant number of common initiatives across its partnerships. When relevant, these activities would also include EMBL strategic local alliances (Chapter 14: People, Processes, and Places). A number of **cross-institutional scientific themes** will be introduced to break research silos and bring talent and ideas together. Themes that have already been identified in discussions with partners include cancer, neurobiology with focus on the gut-brain axis and neurodegeneration, ageing, microbiome, infection biology, and systems biology. Based on these shared interests, EMBL would introduce tools and mechanisms that could support their implementation, such as scientific exchanges (examples could include short-term visits and sabbaticals, joint lab retreats, partnership seminar programme hosted at EMBL sites, continuation of the EMBL Partnership Conference, young investigator meetings); joint training opportunities (examples could include a co-funded programme on joint postdocs modelled on the EMBL Interdisciplinary Postdocs (EIPOD) programme, joint workshops, a partnership summer school); policy exchanges and joint policy initiatives when appropriate (examples could include initiatives relating to green research or diversity). Partner institutes could also be included in TREC activities (Chapter 7: Planetary Biology), when appropriate.

In addition to these scientific areas, EMBL will seek to connect and offer its experience and know-how in fields such as technology transfer and industry engagement, international relations, and training. To support the information flow and connectivity across the partners, EMBL would deploy and support an appropriate communication platform for its partnership network. Where feasible, EMBL and the partners will seek to attract private funding and EU Framework Programme funding for common activities. In addition, EMBL will encourage its partners to capitalise on their close link with EMBL and act as gateways and demonstrators of EMBL's opportunities and membership benefits to their respective national communities.

EIROforum

European Intergovernmental Research Organisation forum (EIROForum), an alliance which brings together eight of Europe's largest research organisations, remains an important network for EMBL. During EMBL's EIROforum chairmanship (2017–2018), EIROforum renewed its biannual Work Plan with the European Commission for the period of 2018–2020, took part in major European conferences on research infrastructures, and organised a session at the American Association for the Advancement of Science (AAAS) Conference. EMBL will take over the rotating chairmanship of EIROforum again in July 2025 through to June 2026. As EMBL is committed to becoming more green, it has initiated engagement on green topics with the EIROforum partners in 2020. An EIROforum working group is looking into the progress made across all organisations.

European Commission

Since 2011, EMBL has had in place a collaboration with the European Commission (EC) based on a Memorandum of Understanding. Within this framework, EMBL provides policy advice, participates in major EC-organised conferences, and provides input to EC plans and roadmaps for the preparation of **Horizon Europe**. At the same time, EMBL has been very successful in obtaining competitive EC funding from Horizon 2020. A total of 26 prestigious ERC grants were awarded to EMBL group leaders. EMBL had the support of Marie Skłodowska-Curie Actions to co-fund three EIPOD programmes which supported approximately 120 fellows. In terms of research infrastructure funding, over 30 grants were received, for a total of approximately €27 million. Following the appointment of Mariya Gabriel as the new Commissioner for Innovation, Research, Culture, Education and Youth in 2019, EMBL has continued to maintain close ties with the EC departments.

Europe's strength has always been a knowledge-based, sustainable, and inclusive society, prepared to face the most complex of challenges from the world. Europe has committed to the United Nations' 2030 Agenda for Sustainable Development which aims to tackle societal challenges including climate change, biodiversity loss, and ecosystem degradation. As such, the European Union's (EU) next research and innovation programme, Horizon Europe which runs from 2021 to 2027, is focused on seven broad societal challenges: health; agriculture, maritime, and bioeconomy; energy; transport; climate action, environment, resource efficiency, and raw materials; reflective societies; and security. EMBL will also work with the EC on the EU-wide research and innovation missions to help deliver scientifically-driven and societally-relevant solutions to these challenges: the spread of cancer; climate change; healthy oceans, seas, coastal, and inland waters; climate-neutral and smart cities; and soil health and food.

The EC launched its **European Green Deal** in 2020 with the goal of becoming the world's first climate-neutral continent by 2050. As the EMBL Programme shares similar aspirations with the European Green Deal, EMBL will aim to collaborate on key projects that touch on research and innovation. In particular, Horizon Europe, which will be launched in 2021, also links research to the UN Sustainable Development Goals and EMBL can contribute with its growing research and expertise in areas such as antibiotic resistance, biodiversity collapse, climate change, and pollution. In addition, research infrastructures and e-infrastructures, access, health research, and researchers' careers will remain key topics for collaboration.

EOSC

The **European Open Science Cloud (EOSC)** is a joint initiative from the EC, its Member States, Associated Countries, and stakeholders from different communities aiming to federate existing and emerging research data infrastructures under a common governance structure. Delivering on the Open Science policies in Horizon 2020, the EOSC will offer a virtual environment providing researchers with access to a web of FAIR (Findable, Accessible, Interoperable, and Reusable) research data across different disciplines and countries in Europe and beyond, including access to infrastructures, software and services beyond disciplinary silos (Figure EC3). Thus, EOSC will set the foundation for a European Digital Single Market to unleash the unprecedented potential for new transdisciplinary research and innovation, initially focused on data and services from publicly funded research but expanding to the public and the industry sectors at later stages.

EMBL sees EOSC as an important catalyst to open science and to widen the use of EMBL data resources across the global life sciences and to further communities. EOSC might also play a critical role for the successful delivery on EMBL's novel research missions by providing seamless access to data from the new Programme research themes: planetary biology, human ecosystems, infection biology and theoretical biology. As the host of one of the world's most comprehensive range of freely available and up-to-date molecular data resources, EMBL supports this approach to open science and has contributed to the development of EOSC

on different levels, e.g. through coordination of and participation in key H2020 EOSC projects such as the EOSC-pilot, EOSC-hub and recently the ESFRI cluster project EOSC-Life. At the governance level, EMBL has been represented on the 11-strong EOSC Executive Board and is also coordinating the Board's working group dedicated to EOSC's future sustainability closely working with the EC and its Member States and Associated Countries. Continuing such close engagement allows EMBL to share best practice with other institutions and stakeholders, also across disciplines, and shape the development of Europe's common policies and standards landscape for the future and for the benefit of society.

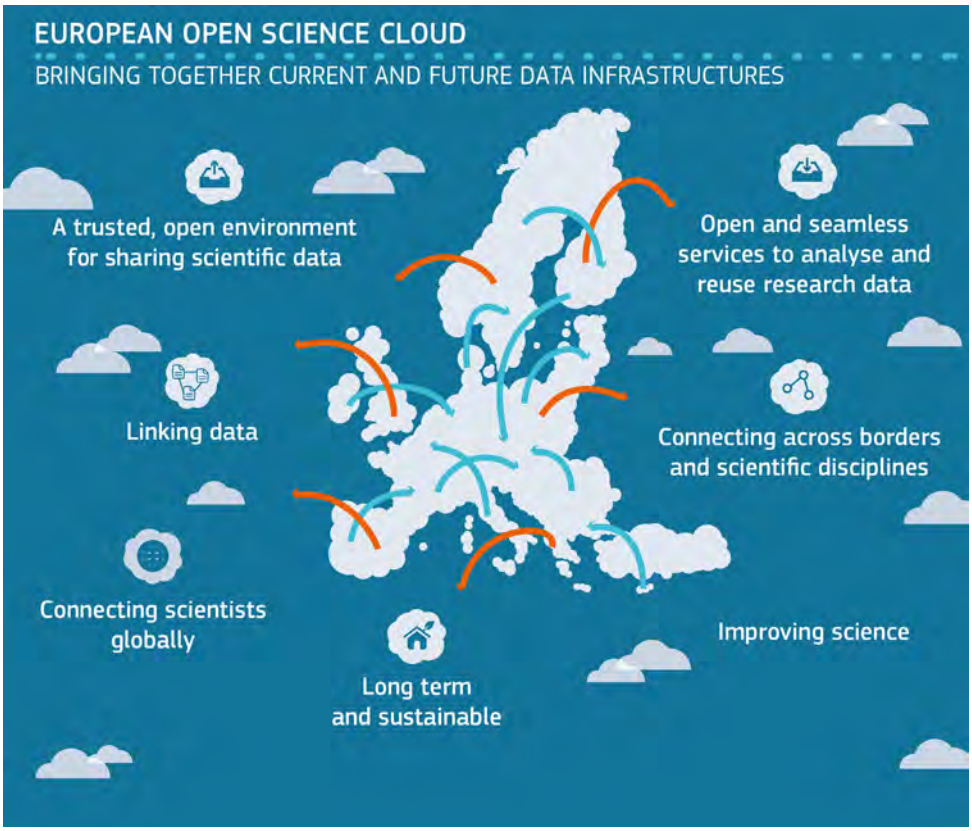

Figure EC3 | The European Open Science Cloud.
Source: European Commission.

EMBL's Role in ESFRI Projects

The **European Strategic Forum on Research Infrastructures (ESFRI)** was established in 2002 as an informal forum composed of representatives from the Member States and Associated Countries of the EU and the European Commission with the mandate of the Competitiveness Council of the EU. The aim of this forum is to support a coherent and strategic approach to policymaking on research infrastructures in Europe and to establish a European roadmap for research infrastructures. The first ESFRI roadmap was published in 2006 and included ELIXIR and Instruct; the second roadmap in 2008 included Euro-BioImaging and the European Marine Biological Resource Centre. As an EIROforum member, EMBL has the right to submit its own proposals to the ESFRI roadmap process. The latest ESFRI roadmap in 2018 included all four projects with EMBL involvement as ESFRI landmarks.

ELIXIR

ELIXIR is a distributed infrastructure for life sciences information, a unique initiative that consolidates national centres, services and core bioinformatics resources into a single coordinated infrastructure. ELIXIR connects the national bioinformatics infrastructures in its 21 member states with EMBL-EBI and provides an excellent model for how national research infrastructures can work together to form a united European operation. EMBL's deep involvement in ELIXIR since its inception has given this infrastructure a firm footing in the bioinformatics community and provided EMBL with a formal mechanism for collaboration in data provision and standards setting.

EMBL's participation in ELIXIR takes many forms currently and will continue in the next scientific Programme. These include:

- transfer of EMBL's expertise and experience to build interoperable resources across the ELIXIR nodes;
- collaborations with scientists from ELIXIR member states;
- engagement with user communities to co-develop standards and metadata models;
- provision of technical know-how and infrastructure such as compute platforms;
- hosting of the ELIXIR hub;
- participation in capacity strengthening through training for trainers, leaders and technical operators of research infrastructures; and,
- evaluation of the scientific and economic impact of open data resources and training.

Instruct

The **Integrated Structural Biology Infrastructure (Instruct)** is a distributed research infrastructure that provides access to a broad palette of state-of-the-art technology and expertise as well as training and technology development in the area of integrated structural and cell biology. EMBL was a member of the Instruct preparatory phase project and joined as an observer when the Instruct-ERIC was established in 2016 and became a full member in 2020. Through the membership, EMBL is now in an excellent position to support a pan-European strategy for structural biology service provision, technology development and training. An Instruct-ERIC Centre is being established by EMBL with services provided through Instruct in Hamburg, Grenoble, and Heidelberg.

Euro-BioImaging

The **European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences (Euro-BioImaging)** provides large-scale open access to state-of-the-art imaging technologies for life scientists (Figure EC4). The Euro-BioImaging ERIC was launched in 2019, with EMBL hosting its coordinating headquarters for access to biological imaging (the so-called Bio-Hub), as well as image data services. In 2010, the EC entrusted EMBL with planning for this new research infrastructure for imaging technologies. Jointly with 26 national imaging communities across Europe, EMBL developed a common pan-European concept, which is now jointly owned and operated by 14 European countries and EMBL. In recent years, these 14 countries made major investments in service platforms for commercially available microscopy and integrated their national imaging centres into this European infrastructure. They entrusted EMBL with the coordination and networking function for those infrastructures, thereby allowing open access for the best European scientists.

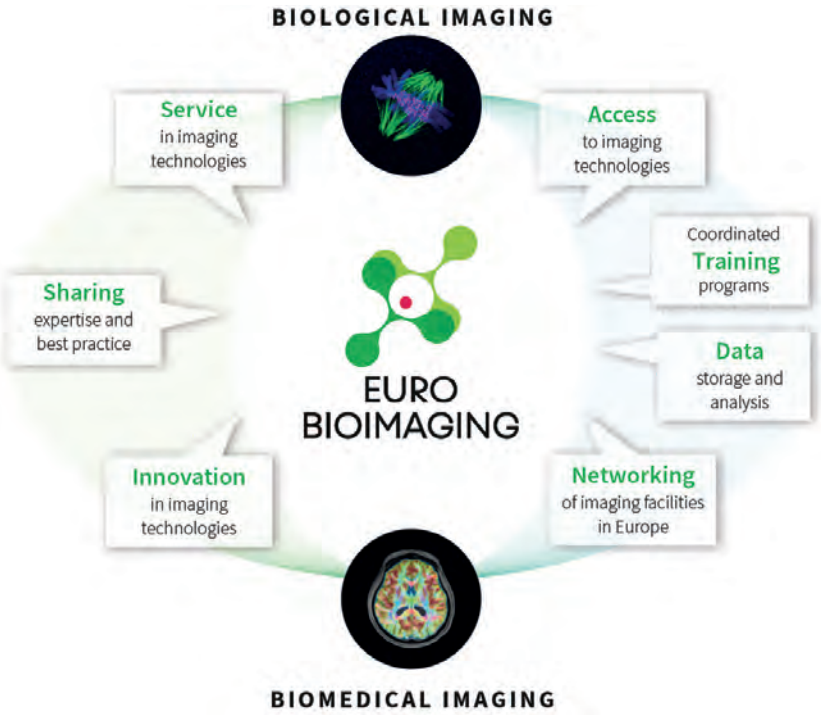

Figure EC4 | Euro-BioImaging.
After EMBL spearheaded the planning phase starting in 2010, the Euro-BioImaging ERIC became fully operational in 2019 and offers all life scientists open access to imaging technologies, training and data services in biological and biomedical imaging. The Euro-BioImaging EMBL-Node (hosted by Heidelberg and Barcelona) offers a unique collection of state-of-the-art microscopy equipment to visiting scientists. EMBL also coordinates Euro-BioImaging's general data services and hosts part of the Euro-BioImaging headquarters, the so-called Bio Hub, which strategically coordinates access to biological imaging technologies and image data.

In this EMBL Programme, the study of oceans and coastal ecosystems will be one aspect of the planetary biology research theme, partly because they provide a rich and largely unexplored reservoir of biodiversity and also because of their great potential to contribute to understanding the impacts of climate change, pollution, and food and energy security. In view of the direction of its new Programme, EMBL envisages a closer collaboration with the **European Marine Biological Resource Centre (EMBRC-ERIC)** which aims to lead efforts to acquire sufficient understanding of marine ecosystems to allow the sustainable exploitation of marine biological resources. The EMBRC-ERIC mobilises and links the currently fragmented infrastructure and marine resources in Europe and plays a key role in unlocking the potential of the marine realm for new concepts and as drivers for technology development and industry innovation.

Global Engagement

EMBL's ambition is to offer a distinct European voice, while facilitating a truly global debate on themes relating to planetary and human health. International collaboration in research brings together efforts at the national level by facilitating the exchange of knowledge, skills, talent, technology and services. It also provides countries with the opportunity to be involved in large research networks and infrastructure that often require global action and support.

In past years, EMBL was able to strengthen various thematic collaborative links to several international partners including the United States of America, by actively nurturing the EMBL-Stanford Alliance, and Japan, through a collaboration with NINS-NIBB that aims to enable exchange of expertise in imaging research and technologies. EMBL's vision to study the complexity of life in its environment – be it on an ecosystems,

organism, or cellular scale – requires an even more decisive international reach. To this end, EMBL will continue engaging in targeted collaborations with world-class partners including via leadership and participation in consortia described below.

Global BioImaging

On behalf of 10 international infrastructure partners in Asia, Australia, Africa, the Americas, and Europe, EMBL coordinates **Global BioImaging (GBI), an international network of open access imaging infrastructures and communities around the world**. GBI was initiated in 2015 by a European (Horizon 2020) grant. Recognising that scientific, technical and data challenges are universal rather than restricted by geographical boundaries, GBI brings together imaging facility operators and technical staff, scientists, managers and science policy officers from around the globe to network, exchange experiences and build capacity internationally. In 2019, EMBL, on behalf of GBI, was able to attract new funding from the Chan Zuckerberg Initiative, to continue and further expand the GBI network activities with an emphasis on capacity building and international exchange for image core facility staff.

Global Biodata Coalition

The Global Biodata Coalition (GBC) is a nascent funder-supported effort that will both coordinate and increase appropriate funding of core life sciences data resources worldwide. As researchers from more and more countries generate and access publicly available data, the GBC aims to engage funders in regions where public data resources are heavily used but investment is missing, hence securing a sustainable future for the world's open biodata resources.

EMBL-EBI is actively engaged with the GBC through participation in its steering committee and in the development of a business case to help establish a governance structure, strategic plan, and funding stream for the GBC. The primary objective of the GBC is to ensure long-term funding for core data resources. Researchers have relied on international resources such as the wwPDB and INSDC data resources for decades, but the current system is fundamentally unsustainable because many, if not most, of the heavily used core data resources are largely funded by short-term grants. GBC will act to aid funders in managing long-term support for data resources while also helping the data resources themselves by advising on improved governance structures, active service management, and community-driven scientific development.

EMBL's goal, as part of the GBC, is to support the transformation of science funding for long-term support of data resources on the basis of their value to the research community. The GBC will follow the lead of other international coalitions, such as those in health and physical sciences, in setting priorities and evaluating effort. The coalition will work with stakeholders in science, policy and other arenas towards establishing a reliable, supported, core set of data resources sustained by many partners that operate worldwide.

Responsibility to Advance Science

EMBL is a hotbed for ground-breaking research and discovery-driven innovation. Conscious of increasing social and environmental disparities, EMBL is committed to contributing its expertise in these areas to promote sustainable growth in resource-limited regions of the world. Faced with challenges related to climate change, biodiversity loss, water resources, food security, and health, less advanced scientific regions often develop unique research perspectives, ecosystems and ingenious technologies. Whenever feasible and advantageous, EMBL will seek to collaborate, share experience, and help deliver technologies that could bring environmental and health benefits to communities and vulnerable geographic areas.